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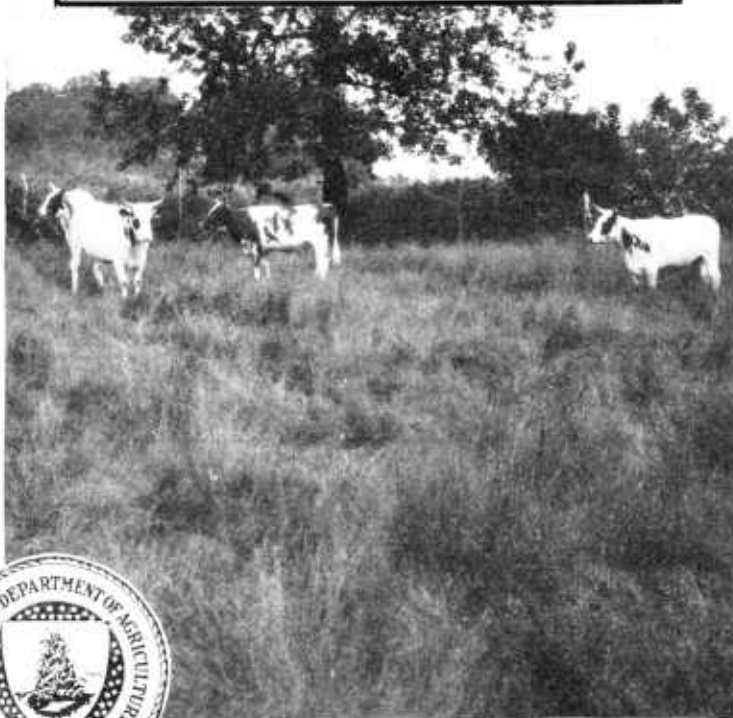
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CARE AND MANAGEMENT *of* DAIRY COWS



THE MOST successful dairymen keep good cows only, feed them well, and manage them properly. Their cows are housed in stables conveniently arranged for dairy work, dry and well ventilated, and easily kept clean. Because profitable cows must be comfortable cows, all dairy operations must be planned with due regard to their comfort.

The constantly increasing demand for high quality in dairy products calls for more and more attention to cleanliness and sanitation on the dairy farm. For this reason, as well as to avoid losses, diseases among the cows must be guarded against.

Efficient management requires that breeding and production records be kept. Careful and continuous attention must be given to various details in order that expenses may be kept down.

This bulletin describes certain practices in the care and management of dairy cows which practical experience as well as scientific investigations have shown to be successful.

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CARE AND MANAGEMENT OF DAIRY COWS

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SUCCESS in dairying depends largely upon the proper care and the efficient management of the herd. Unless the dairy farmer is thoroughly acquainted with approved practices he is likely to make many costly mistakes. The purpose of this bulletin is to present important facts, pertaining to the care and management of dairy cows and to describe briefly the practices which experience has shown to be good.

CARING FOR THE DRY COW

It is generally considered that a cow should be dry for a time before calving, for four principal reasons: (1) To rest the organs of milk secretion; (2) to permit the nutrients in the feed to be used in developing the fetus instead of in producing milk; (3) to enable the cow to replenish in her body the stores of minerals which may have become depleted through milk production; and (4) to permit her to build up a reserve of body tissue before calving.

DRYING OFF

Most cows can be dried off merely by gradually lessening the frequency of milking. That is, at first miss one milking for a few days, then miss two, then three, etc. When the daily production is only

6 or 8 pounds, milking may be stopped entirely. Nothing should be done to the udder to stimulate the secretion of milk. In drying off persistent producers it is often necessary to apply more drastic measures, such as reducing the grain ration or withholding it entirely, substituting grass hay or straw for legume hay, discontinuing succulent feed, and reducing the allowance of water.

Recent work at the Minnesota Agricultural Experiment Station and also in the Bureau of Dairy Industry, United States Department of Agriculture, indicates that cows giving as much as 20 pounds of milk a day may be dried off by simply ceasing to milk them.

LENGTH OF DRY PERIOD

The length of the dry period should depend on the quantity of milk the cow has been producing and her condition as regards flesh. The greater the yield of milk the more likely are the nutrients used in milk secretion to have been depleted and the longer is the dry period required. Cows of low or medium production should be dry a month or six weeks, provided they are in good flesh. Thin cows may need a somewhat longer period. High producers may require two months or more to get in proper condition for calving.

CONDITION OF THE COW AT CALVING TIME

Cows normally lose weight for three to six weeks after calving, because they can not consume enough feed to provide adequately for both the milk flow and the maintenance of body weight. Therefore, in order that they may not become too thin after calving, it is necessary that they carry considerable flesh at calving time. Cows in good condition at calving time will start the lactation period at a higher level of production than will thin cows; this results in a larger yield of milk for the year. Cows are under a considerable strain at calving time and need a reserve of body tissues on which to draw until they recover. There is no economy in having cows thin at calving time. The value of the additional milk yielded by cows in good condition will more than offset the cost of the feed required to put them in good condition.

On the other hand it appears that cows should not be extremely fat at calving time. Very fat cows are likely to have poor appetites after calving and are often troubled with excessive congestion of the udder. The feeder should, to a large extent, be guided by the condition of the cow's udder. If the udder becomes badly swollen the cow's grain allowance should be reduced.

Liberal feeding (12 pounds of grain a day), as compared with moderate feeding (4 pounds of grain a day), for two months before calving fails to change the condition of the cow materially or to increase the quantity of milk produced after calving. Therefore it seems that cows should be so fed during the lactation period that they will be in good flesh when they are dried off. Apparently it is the condition of the cow that counts, rather than the level at which she is fed before calving.

The feed during the dry period should contain liberal quantities of protein and minerals, especially calcium (lime) and phosphorus. Legumes, either as pasture or hay, furnish available lime; wheat bran, cottonseed meal, and linseed meal are the principal sources of phos-

phorus. Green grass or other green forage promotes the assimilation of calcium. A dry cow on pasture composed partly or wholly of legumes, and receiving bran in addition, will be amply supplied with lime and phosphorus. If the pasture contains no legumes, equal quantities of steamed bone meal and salt may be mixed and put where the cow can get all she wants of the mixture. In the winter, legume hay of good quality and a grain mixture containing wheat bran, cottonseed meal, or linseed meal will supply the needed minerals. Considerable protein is required for the development of the fetus. The feeds already mentioned as being high in lime and phosphorus are high in protein also.

CARING FOR THE FRESH COW

AT CALVING TIME

In handling cows that are heavy with calf, care should be taken to prevent them from being injured by slipping on stable floors or on ice, by crowding through doorways, or by mounting cows that may be in heat. Confine all cows which are in heat, or at least separate them from the cows that are heavy with calf. In other particulars, the pregnant cow may be handled like the rest of the herd.

A week or two before the cow is due to calve, keep her under close observation, as she may need special attention when calving. If she has been on pasture, she may be kept there; but her condition should be observed at least twice daily. If she is to calve in winter, place her in a clean, roomy, well-bedded box stall. Sometimes the udder becomes so large and swollen that it is desirable to draw out some of the milk before she calves; this, however, is seldom necessary and should be avoided if possible, because it stimulates further secretion and because the first milk (colostrum) is beneficial to the calf. Keep the cow as quiet as possible; dogs and small children are likely to excite her at this time. Feed her a laxative ration; wheat bran and linseed meal are especially good.

Immediately after the cow has calved, give her warm water to drink if the weather is cold. If the cow becomes chilled at this time, the afterbirth may not be passed so readily, and she may be predisposed to other ailments. It is also best not to draw all the milk from the udder for a day or two after the calving. Leaving some of this milk may help to prevent milk fever.

After a couple of days, under normal conditions, the cow may be placed in the stable with the milking herd. The calf may be removed from her any time after about 12 hours. Give the cow as much roughage as she will eat, provided she is accustomed to a liberal allowance of roughage, but feed concentrates sparingly at first and increase them gradually. Take not less than three weeks to get the cow up to full feed. Too much concentrated feed at this time is likely to cause digestive disturbances and to hinder the reduction of swelling in the udder. In general, it is better to err in not giving sufficient concentrates than in giving too much. The quantity to be given just after calving is usually 4 to 8 pounds a day, depending upon the size of the cow, her production, and the condition of her udder.

SEASON OF YEAR FOR FRESHENING

Table 1, based upon a study made by the Bureau of Dairy Industry of nearly 115,000 cows in herds belonging to members of dairy-herd improvement associations, shows the most profitable season for cows to freshen in.

TABLE 1.—*Season of freshening, with average yearly records of production, cost of feed, and income over cost of feed, per cow*

Season of freshening	Cows	Milk pro- duction	Butter- fat pro- duction	Cost of rough- age	Cost of grain	Total cost of feed	Income over total cost of feed
	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Spring (March-May).....	27,769	7,313	284	38	32	70	108
Summer (June-August).....	16,369	7,209	284	40	39	79	112
Fall (September-November).....	37,128	7,821	309	38	40	78	115
Winter (December-February).....	33,304	7,686	301	37	36	73	112
Total or average.....	114,570	7,571	297	38	37	75	112

The cows that freshened in the fall ranked highest in average yearly production of milk and butterfat, and in income over cost of feed; the cows that freshened in the winter ranked second in average production of milk and butterfat but produced the same income over cost of feed per cow as did those that freshened in the summer. The cows that freshened in the spring ranked lowest in income over cost of feed.

Cows that calve in the spring usually give a big flow of milk early in the summer, when butterfat is usually low in price. They are very likely to suffer a severe setback in milk production later in the summer because of heat, flies, and short pasture. It is difficult to get them back to high production in the fall and winter; consequently, they must be carried through the winter on expensive feeds with a very small margin of profit.

There are several advantages in having cows freshen in the fall. Butterfat usually brings a higher price then and in the winter. Labor is easier to obtain, and there is more time to care for the calves and for a large supply of milk. Fall-dropped calves are easier to raise and usually are less subject to disease. The fall-freshening cows, if properly fed and handled, as a rule produce well in winter and fall off as spring opens. At this time, however, the spring-pasture grass acts as a stimulus and causes increased production in spring and early summer. Their period of lowest production is July and August, when conditions are extremely unfavorable for high production.

However, in localities where the pasture season is long and grass abundant, it may be more economical to have cows freshen in the spring and produce most of their milk on cheap pasture.

The dairyman who sells his milk to a city retail trade should have some cows freshening at all seasons of the year in order to keep up a steady flow of milk. However, this point is not so important for dairymen who separate the milk, sell the cream, and use the skim milk for feeding.

METHOD AND ORDER OF FEEDING

The quantity of grain to be fed to each cow should be carefully determined. A number of methods for feeding the grain are in use, but the most practical is to place a general herd mixture in a truck or cart that is pushed through the feeding alley and to weigh or measure the quantity for each animal. (Fig. 1.) Some cows may need certain feeds that are not included in the herd mixture, but these cows can easily be fed later. A feeding card or sheet, showing the quantity of feed each cow is to get should be used. A small blackboard can be attached to the feed cart and the figures placed on this board. A spring-balance scale suspended on an arm above the cart will be of great help.



FIGURE 1.—Feeding from a truck

Silage can be fed from the same or a similar cart. If an occasional scoopful of silage is weighed as a check, the quantity which is being fed can be measured with a fair degree of accuracy by counting the scoopfuls.

Baled hay is convenient for feeding. If loose hay is fed, the hay chutes should be conveniently placed so that the feeding requires as little work as possible. Weigh the allowance of hay occasionally.

Feed cows regularly, because they are probably more sensitive to change in the feeding routine than to variation in the hours of milking. Grain is usually fed before milking and the roughage afterward. This practice tends to avoid dust in the stable air during milking. Silage and other feeds that might taint the milk should be fed after milking. Feed about half the grain and roughage in the morning and half in the evening. If cows are milked oftener than twice a day, the grain feedings should correspond, but the roughage can still be fed twice a day. Some dairymen feed grain on the silage.¹

¹ Detailed information on feeding is given in Farmer's Bulletin 1626, Feeding Dairy Cows.

SALTING

Dairy cows should have all the salt they want. The quantity consumed will vary with the kind of feed and the size of the animal.



FIGURE 2.—Salt box with roof to keep out the rain

Experiments have shown that average-producing cows in milk eat at least 1 ounce of salt a day. High producers should get more. Many dairymen mix salt with the grain at the rate of 1 pound of salt to each 100 pounds of grain. In addition they put salt where the cows can get it when they want it. Stock salt can be purchased in several forms. In cake form it may be kept in each feed box in the barn or put in convenient places in the lot or pasture. It should be sheltered to prevent the rain from dissolving it. (Fig.2.)

WATERING

A plentiful supply of fresh, clean water is essential on the dairy farm. (Fig. 3.) The dairy cow's demand for water depends mainly upon the air temperature, the quantity of milk produced, and the amount of succulent feed in the ration. The



FIGURE 3.—A practical concrete watering tank, accessible from three lots

quantity of water drunk in cold weather is about the same as that drunk in moderate weather but much smaller than that drunk in hot weather. If large quantities of such feeds as beets or mangels are fed, very little water is required.

In experiments at the dairy experiment station at Beltsville, cows were watered once a day, twice a day, and at will from watering cups. When they were watered once a day, they drank less water and produced less milk than when watered twice a day or at will. When they were watered twice a day, they drank as much but produced less than when they were watered at will. The cows used were average producers. The greatest difference in production was between watering once a day and at will. This amounted to only about 5 per cent. The higher the production the greater the benefit from frequent watering. Some low-producing cows fed silage, hay, and grain refused to drink more than once a day in cold weather. Cows of similar production and receiving the same kind of feed drank 80 per cent more water in summer than in winter. The demand for water was greatest after eating hay. In cold weather cows prefer water that has been warmed and will drink more of it, though experiments at several stations show that the amount of milk produced is influenced but little by warming the drinking water.

MILKING

REGULARITY

On most dairy farms milking takes the greatest amount of time and to many persons is the most irksome of all dairy work. It has been commonly assumed that cows should not only be milked regularly but that they should also be milked each time by the same man. Doubtless this had had much to do with many persons' distaste for dairy work.

Experiments at the Beltsville station show that average-to-good cows may be milked at irregular hours without any marked effect upon production. Whether very high producers would show similar results has not been determined. When irregular milking was accompanied by irregular feeding, the production was lessened about 5 per cent. Apparently cows are more sensitive to changes in the feeding routine than to variation in the hours of milking. It is not to be concluded from these experiments that regularity in doing the dairy work is of little importance, but rather that cows can occasionally be milked earlier or later than usual at times when other work is pressing.

Though it is generally believed that a cow will produce more when milked always by the same person, the practice in many dairies employing several milkers is to milk the cows as they come, rather than to reserve certain cows for each man. Some milkers are more efficient than others. The effect of changing milkers seems to depend as much or more upon this than upon the matter of strangeness, provided, of course, that the cows are accustomed to seeing several persons around the dairy.

FREQUENCY

Recent investigations show that milk is secreted continually by the cow instead of mainly at time of milking, as was formerly believed. Between one milking and the next the udder gradually fills with milk. The "giving down" of the milk is mostly caused by releasing the milk into the milk cisterns and teats where it can be drawn,

rather than by actual secretion at the time. As the udder becomes distended with milk, secretion is less active and the greater the distention the more pronounced is the check upon secretion. This is the principal if not the only explanation for the increase in production obtained by more frequent milking.

The increase to be expected by milking cows three times a day instead of twice will vary from about 10 per cent for short periods of a month or so to 20 per cent or more for whole lactations. Cows milked three times a day produce more persistently. The percentage of butterfat in the milk is not affected. Whether it will pay to milk cows three times a day instead of twice must be determined by the individual dairyman. The profit depends upon the quantity of production, the length of time the extra milking is to be practiced, the cost of doing the extra milking, the cost of extra grain that must be fed, and the value of the product. For each extra pound of milk produced, one must allow 0.4 to 0.6 pound of grain, depending upon the richness of the milk. In general, it appears that high-producing cows whose product is disposed of at good prices can be milked profitably three times a day. On the other hand, low or medium-producing cows whose product is used for making butter, cheese, or condensed milk should not be milked more than twice a day.

MILKING BY HAND OR BY MACHINE

Milking by hand should be so done as to obtain clean milk and all the milk, with the least discomfort to the cow and as quickly as possible. Some milkers, through unnecessary roughness, an unusually strong grip, or long finger nails, keep the cow uneasy during milking. Such a practice may lead to the habit of kicking.

Certain manipulations of the udder in order to get all the milk have been practiced. These manipulations apparently increase the production slightly, but have never come into general use, although an abbreviated modification of the method is practical. An upward pressure on each quarter of the udder exerted a few times when milking is nearly completed, will help to bring the milk into the teats where it can be drawn.

Milking machines are successful on many dairy farms. They save labor and their operation is easier and to many persons more agreeable than hand milking. Some of the outfits now on the market are low enough in price to be within reach of the owners of small herds.

If milking machines are effectively washed and are then treated with heat or bactericidal solutions, the machine-drawn milk should be cleaner than that drawn by hand because it is better protected from contamination by the cow, the milker, and the stable air.

So far as quantity of production is concerned, the mechanical milking appears equal to good hand milking. It is the general practice for a hand milker to follow the machine to see that the milking is completely done and to draw any milk that is left.

It has been claimed that machine milking causes udder troubles, and with the earlier models of milking machines there was doubtless some ground for such a claim, especially if they were left on the teats too long. More recent models, so constructed as not to interfere with the circulation of blood through the teats, are thought to obviate the likelihood of such trouble. Failures with the mechanical

milker can often be traced to a lack of mechanical knowledge on the part of the operator, carelessness of operation, or lack of attention to proper cleaning of the machine. The increased use of the milking machine indicates its practicability.

HOUSING DAIRY COWS

The main requirements in housing dairy cows in winter are to keep them dry and out of the wind and drafts, and to provide plenty of fresh air and sunlight. Apparently temperature in itself is not a vital consideration, except perhaps in the coldest parts of the United States. It has been noted at the Beltsville experiment station that cows produce highest in winter and lowest in summer. Probably there is no advantage in keeping the stable temperature much above freezing in winter and there may be a disadvantage if it rises above 60° F.

TYPES OF BARNs

Types of barns which can be made suitable for dairy cows are the basement barn, 1-story stable, 2-story barn, round barn, and open shed or covered barnyard. (Figs. 4, 5, 6, 7, and 8.)

In a basement barn the cows usually are housed on the lower floor. Owing to the greater protection from the weather afforded by this barn, it is likely to be warmer in winter than are the other types; and probably this is why more of these barns are to be found in the North than in the South. Many basement barns lack sufficient light and are so low that the slope away from the stable does not afford proper drainage of the cow yards. The ventilation and lighting of these barns is generally poorer than those of other types, but the barns can usually be remodeled so as to be satisfactory in these respects.²

The 1-story and 2-story barns (figs. 4 and 5) can be lighted and ventilated better than the basement barn. When a 1-story barn is used other facilities must be provided for storing hay. For this reason, the expense of housing both cows and feed will in many cases be greater with the 1-story barn than with the 2-story barn in which the same roof covers both the cows and the feed.

Apparently the chief advantage of the round barn (fig. 6) is that more space can be inclosed with the same amount of building material than can be inclosed in any other type. Locating the silo in the center of the barn may put the silage in the most convenient place to be fed, but it is likely to fill the stable with odors which may taint the milk; and a silo so located is not so easily filled as one outside the barn.

The open shed or covered barnyard (figs. 7 and 8) is a practical structure for housing dairy cows. Its principal advantages are that it provides the best known method of saving all the fertilizing constituents of the manure; it permits feeding rough materials, such as cornstalks, under shelter and makes it possible to use the uneaten portions for bedding. When there is plenty of bedding cows housed in sheds keep cleaner than those confined in stanchions.

Cows in open sheds produce a little more milk, but at a greater

² For information on barn construction, see Farmers' Bulletin 1342, Dairy Barn Construction.

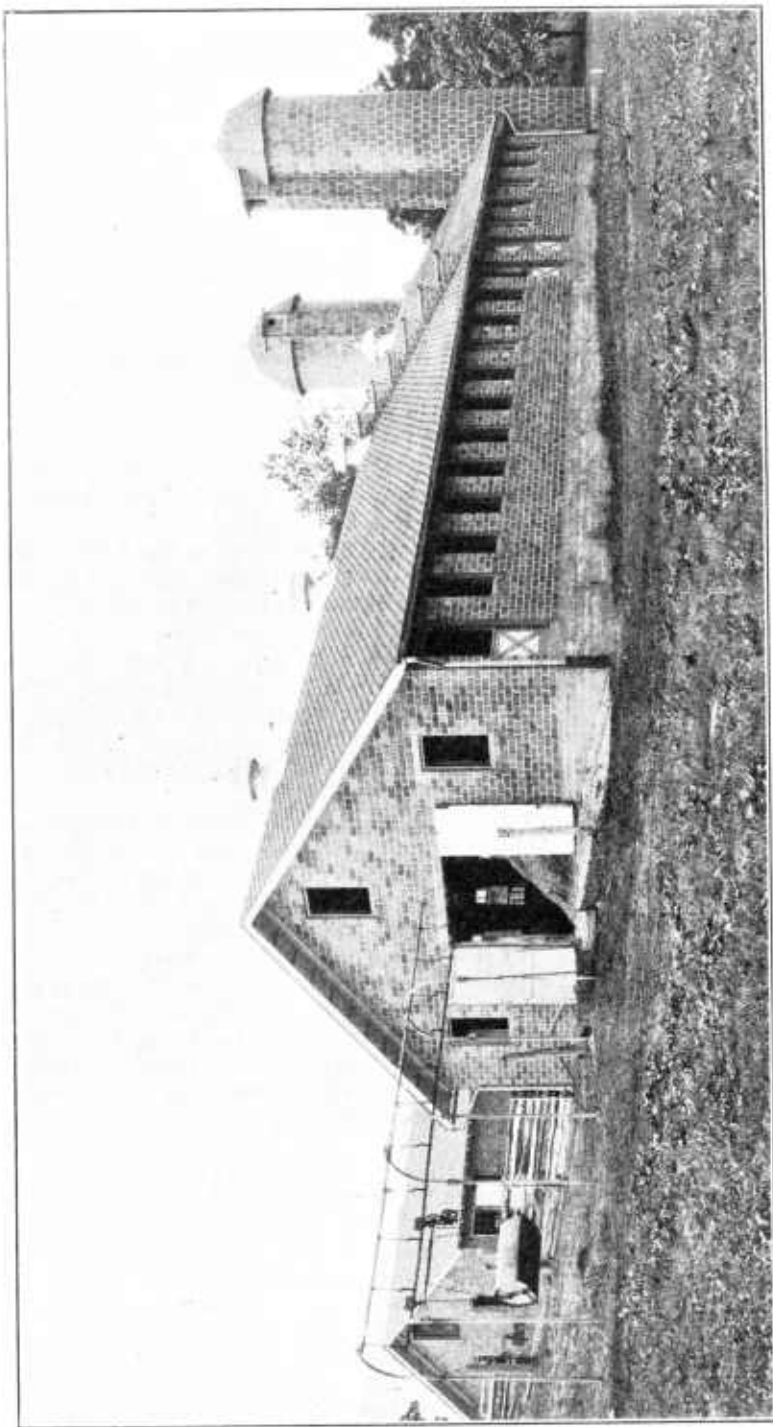


FIGURE 4.—A 1-story milking barn with silos

cost for feed than cows in closed barns. The more timid cows in the shed are fought away from the feed racks, and produce much less milk than usual. Probably it would be economical to confine the cows at feeding time. Cows so housed should be dehorned. Much more bedding is required in open sheds. Figure 7 shows a

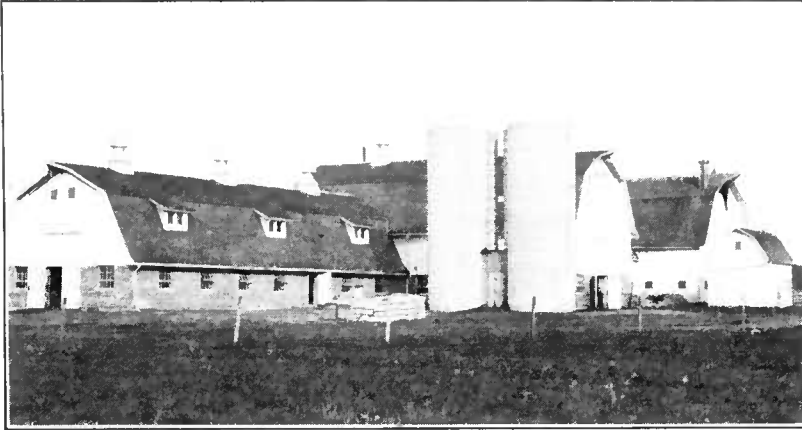


FIGURE 5.—A group of 2-story barns. Note ample hayloft

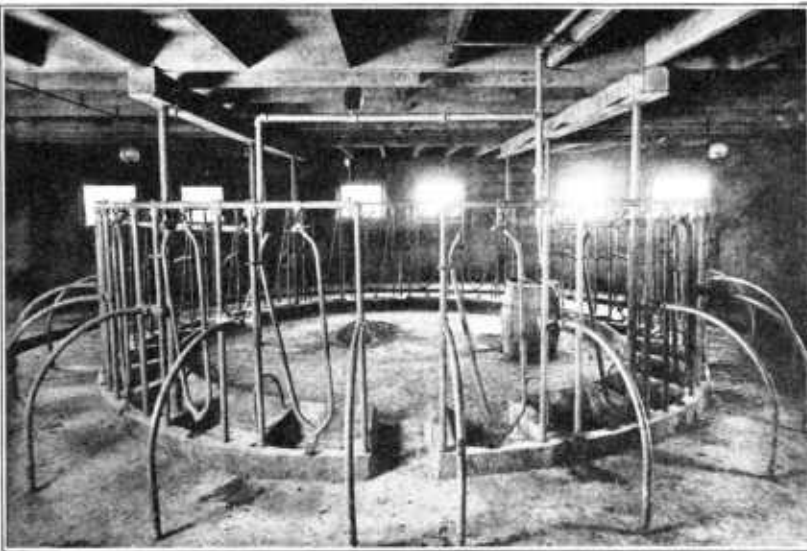


FIGURE 6.—Arrangement of equipment in a round barn

plan of an open shed for housing and milking the cows. This type of structure is inexpensive and provides for easy expansion.

STALL EQUIPMENT

Of the various methods of confining cows, the swinging stanchion (fig. 9), which allows considerable freedom, has met with the greatest popular approval. The old-fashioned rigid stanchion is being

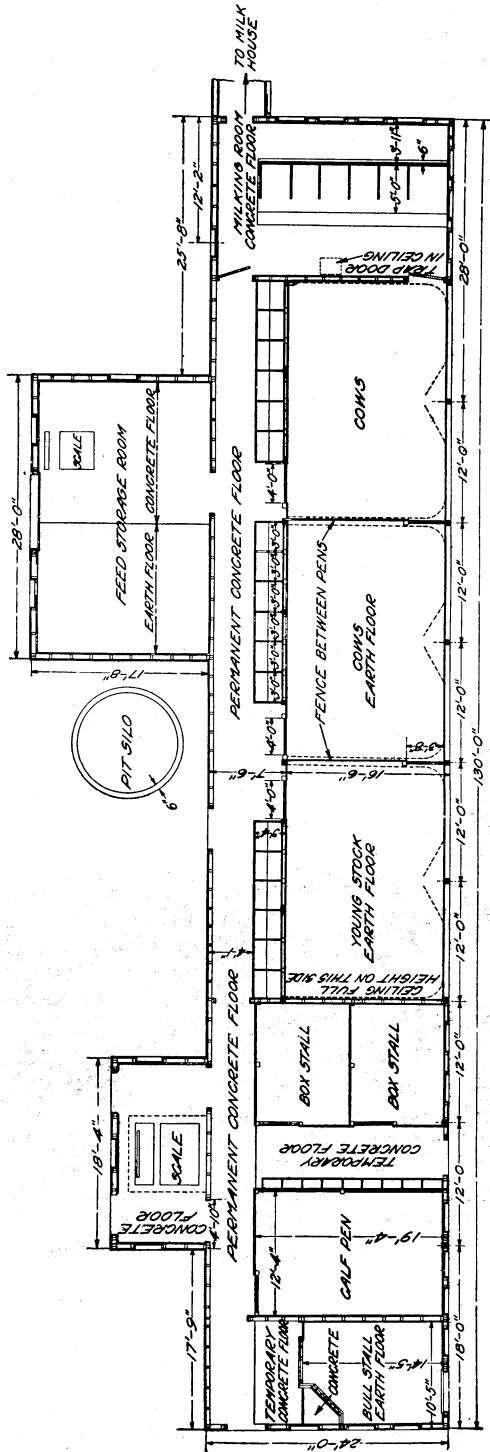


FIGURE 7.—An open shed with six milking stalls at one end. Double doors slide back a long partitions between pens, thus permitting the stable to be closed in extremely cold weather. Each pen is provided with wooden stanchions and mangers so that the cow can be tied when feeding

rapidly replaced with this more humane device: but even the swinging stanchion fails to give the cow enough freedom to meet the approval of many dairymen who are trying to get maximum production regardless of expense. These dairymen use box stalls.

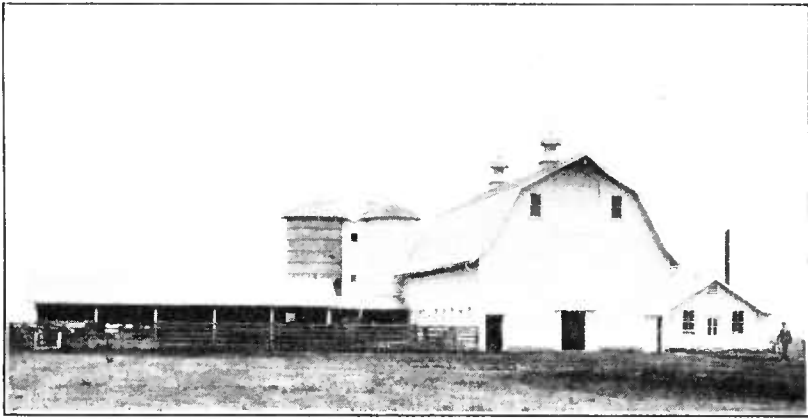


FIGURE 8.—An open shed adjoining a 2-story barn

The use of stanchions requires less space than the use of box stalls, much less labor for feeding the cows and cleaning the stable and only about one-third as much bedding. However, cows confined in

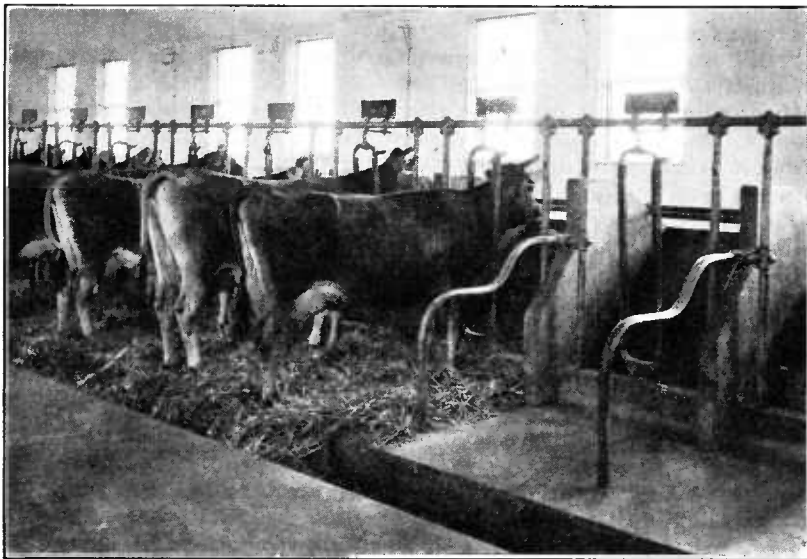


FIGURE 9.—Interior of a modern dairy barn. Note the swinging stanchions, concrete floor, and gutter. The mangers are designed for experimental feeding

stanchions are more likely to have their teats injured by being stepped on, either by themselves or by the cows. Cows in box stalls will produce a little more milk than those kept in stanchions, but the increase is not enough to pay for the extra labor and bedding required.

Dirt floors should not be used in a milking stable. They are insanitary, they can not be flushed, and holes soon appear in them. A stable floor should be durable and easy to keep clean. Concrete should be neither so smooth as to be slippery nor so rough as to make thorough cleaning difficult.

EXERCISE

To prevent cows confined in stanchions from becoming stiff, they should be turned out at least once a day. Besides, the stables are easier to clean and bed when the cows are out, and opportunity is afforded for observing any cows that may be in heat. For highest production, cows require no more exercise than is obtained in walking at will about a small yard. Exercise slightly increases the efficiency of digestion.

CLEANLINESS

GROOMING

Grooming cows daily, removing manure or litter from their bodies, not only improves the appearance of their coats, but also makes possible the production of cleaner milk. Washing and carding the tails occasionally add much to the appearance of the herd.

BEDDING

Bedding is used (1) to provide a comfortable bed, (2) to keep the cow clean, and (3) to absorb the liquid manure. The common bedding materials are wheat straw, oat straw, corn stover, shavings, and sawdust. The desirable qualities of a bedding material are bulkiness, large liquid-holding capacity, high fertilizing value, and freedom from dust.

Straw and shredded corn stover are more bulky than shavings or sawdust.

In liquid-holding capacity the following materials rank in the order named: Shredded or cut corn stover, straw, and shavings and sawdust with little difference between them. Corn stover has the greatest fertilizing value. Oat straw and wheat straw follow in the order named. Sawdust and shavings have only a small fertilizing value.

Shavings are the cleanest form of bedding and for this reason are much used in dairies where very clean milk is produced. In dairies where extra sanitation is not a matter of great importance, it appears that pound for pound, shredded stover or straw is worth at least 50 per cent more than sawdust or shavings. About 4 pounds of wheat straw per cow per day provides a suitable bed and keeps the cows clean when they are confined in stanchions. This quantity is not sufficient to absorb all the liquid manure; to do this, about eight pounds per cow would be required for an average-producing herd. Cows in box stalls need about 14 pounds daily of wheat straw.

Dry, baled peat moss is used to a limited extent in dairies. In ability to absorb liquids, it far exceeds any other bedding material, but in practice about as much peat moss as wheat straw is used per cow per day, for it appears that the quantity of bedding used depends more upon its bulk than upon its liquid-holding capacity. Experiments show that flies breed as readily in the soiled peat moss as in the soiled straw. This is contrary to statements made by some dealers in peat moss.

PAINTING AND WHITEWASHING THE STABLE

If the inside of the cow stable is to be painted, the woodwork or plastering should be as smooth as possible to avoid the necessity for excessive quantities of paint. If it is to be whitewashed, a rough surface is preferable, as whitewash will not adhere so well to smooth surfaces. Linseed oil in light paints has a tendency to turn them yellow. If the stable is to be painted white, therefore, it is better to use some kind of paint which does not contain linseed oil. If the stable is to be painted some color other than white, the change in color will not be so noticeable and linseed-oil paint may be used. As lead is poisonous to cattle, they should not be given any opportunity to lick off the paint before it dries.



FIGURE 10.—Whitewashing an old barn

Cow stables usually are whitewashed once or twice a year. Many whitewash formulas call for adding other substances such as salt or skim milk to the lime and water. Just how much advantage there is in adding such materials is a matter of conjecture. Satisfactory whitewash can be made by the use of lime and water only. The commercially prepared hydrate of lime makes a good whitewash when mixed with water; quicklime, ordinarily called lump lime, may be slacked with a minimum quantity of water and used instead. Only freshly burned lump lime should be used, and any that is air-slacked should be discarded, because whitewash made from such lime will not stick.

Whitewash may be applied with a brush (fig. 10) or with a spray pump. It can be applied more heavily with a brush, and sometimes

one coat so applied will give as good results as two with the sprayer. Spraying, of course, is quicker, but smears the floor and stable equipment more than applying whitewash with the brush. But no matter what method of application is used, time in cleaning will be saved if the stable equipment is covered with old bags or similar material. If the floor is kept wet while the whitewashing is in progress, the whitewash that is dropped can readily be dislodged with water and a brush or broom.

DISPOSING OF MANURE

The advice generally given for handling manure on the dairy farm is to spread the manure on the land as soon as possible after it is made. (Fig. 11.) With certain reservations, this seems to be

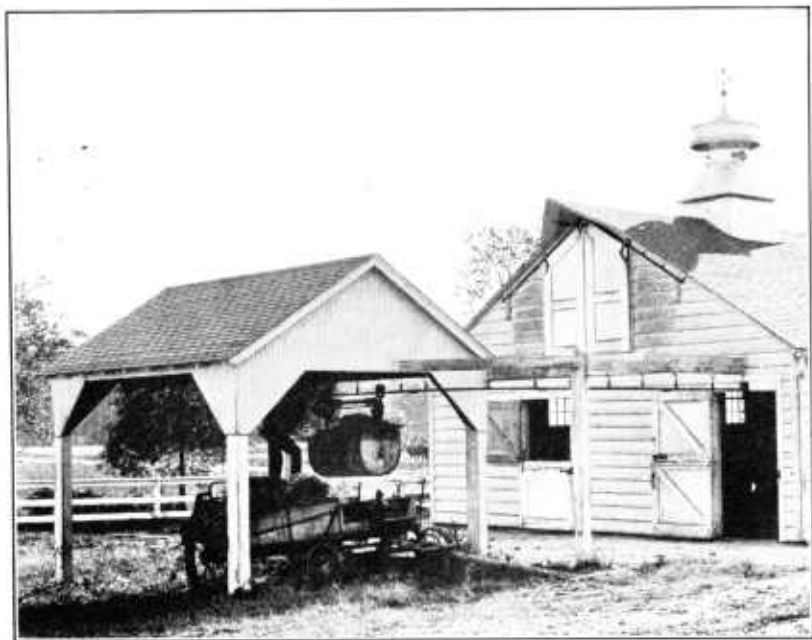


FIGURE 11.—Loading out manure from the barn to the spreader

sound advice. It is questionable whether manure handled in this way in the winter gives greater returns than manure which has been properly stored, but the practice does give better distribution to farm labor and obviates the necessity for a building with large storage space.

Spreading manure on snow, though often advised, is a questionable practice on account of washing, especially if the land is rolling. Probably it is also inadvisable to haul manure on the fields when the ground is so soft that the wagon makes deep ruts.

When farm work is pressing, manure hauling must be delayed. Storage of manure can not well be entirely avoided, therefore, and a suitable storage place should be provided in order to prevent excessive loss of fertilizing ingredients through leaching. In storing manure, plenty of moisture and thorough packing are the main

things to consider. Where bedding is cheap, sufficient material can be used to absorb the liquid manure; where it is costly the liquid can be drained into a cistern, or stored with the solid manure in a water-tight manure pit. All manure should be removed from the stable at least once a day. In well-bedded open sheds or barns where the cows are loose, the manure may accumulate for several months and be removed when it is convenient.

The equipment used in removing manure ranges from a wheelbarrow to a power conveyor running in the gutter behind the cows. In dairies of medium to large size the most popular device is the litter carrier with overhead track, such as is manufactured by several barn-equipment firms. The carrier may discharge directly into a manure spreader or wagon or may go to a manure pit. Inclosing or screening the manure pit will help to control flies.

KEEPING RECORDS

In order to manage a herd of dairy cows properly, it is necessary to keep records. The record system need not be elaborate, but should furnish accurate information on milk and butterfat production of individual animals and on quantity of feed consumed. In addition, breeding dates should be recorded and a plan of identifying and registering the purebred animals should be followed. One should not rely on memory for such information, but should put every item down in writing in such a manner that it can easily be referred to when need arises. Whatever system is adopted should be continued. The records should not be allowed to lapse.

PRODUCTION RECORDS

The principal object of keeping milk-production records is to show definitely which cows are profitable and which are not. The inferior cows can then be disposed of and the better ones kept for production and breeding.

Another important advantage of milk-production records is that they furnish information which is used as a basis for determining rations. Cows should be fed according to the quantity of milk or butterfat they produce. Sickness or other abnormal conditions are generally accompanied by a decrease in milk production. The practice of weighing and recording the milk each day helps to detect troubles at their onset.

Spring-balance scales are necessary. These scales are equipped with adjustable hands, one of which is set at zero when an empty pail is hung on the scale. The quantity of milk may then be read without subtracting the weight of the pail. The milk scales should be graduated to tenths of a pound. If milk pails of different sizes are used by the milkers, it is a good idea to keep a weigh pail at the scales to avoid confusion. The scales should be hung in a convenient place in the barn or milk room.

A suitable sheet on which to record the weight of milk from each cow should be placed in a clean, protected place near the scales. (Fig. 12.) Spaces are provided on these sheets in which to write the name or number of each cow and to record the weights of the milk both morning and evening. Some sheets have spaces for seven days only, but sheets with spaces for an entire month are most com-

monly used. Scales and milk sheets can be obtained from dairy-supply houses. Many publishers of dairy periodicals also distribute milk sheets at nominal prices.

At regular intervals a composite sample of milk from each cow should be tested for butterfat. This composite sample is obtained as follows: For one day or two consecutive days each month take a sample of each cow's milk, night and morning, the quantity of the sample depending on the quantity of the yield. The proper quantity



FIGURE 12.—Milk production records show the profitable cows.

can be obtained by the use of a "milk thief" and a cylindrical vessel or by taking a certain number of cubic centimeters for each pound of milk yielded. Each sample is then thoroughly stirred and mixed with the previous sample or samples to obtain the composite sample for testing.³ The butterfat percentage obtained by testing this sample is used as the average percentage for the month, and the monthly butterfat production is computed from it. For small herds other methods of keeping milk and butterfat records may be used, such as weighing the milk from each cow for one day during the month and testing it for butterfat. The total yearly production of milk and butterfat from each cow, as

shown by such tests, will be close enough to actual production for practical purposes. In some dairies the milk is weighed and tested one day every two months. This method is not so accurate as testing one day each month, but there is not a great deal of difference between the two methods.

If a dairyman is a member of a dairy-herd improvement association, the production records of his cows are kept by the tester hired by the association. (Fig. 13.) The tester visits each member's herd one day each month, weighs and tests the milk of individual cows for that day, weighs the feed, and figures the total milk and butterfat

³ For directions for testing milk, see *Testing Milk and Cream*, U. S. Department of Agriculture Miscellaneous Publication 161.

production and the feed consumed for the month. This has proved to be an economical and reliable method of keeping herd-production records for a number of dairymen in a community.⁴ The herd-testing plan described later, which has been adopted by most dairy-cattle breed associations, serves essentially the same purpose.

BREEDING RECORDS

A record should be made of the date of breeding, the bull to which bred, and date of expected calving. The gestation period for cows is approximately 282 days. It is well to have a gestation table handy for reference in estimating date of calving. If such a table is not available, count back three months from date of breeding and add



FIGURE 13.—The tester tests the milk for percentage of butterfat

10 days. For example, if a cow is bred on March 10, by counting back and adding 10 days, the probable date of calving is found to be December 20. It is well to have the breeding record both in a small pocket-size notebook that can be carried in the work clothes and in some other form not so likely to be lost. Most of the national dairy-breed associations distribute record books and blanks of this kind. Such books are especially helpful if the herd includes registered animals.

REGISTRATION AND IDENTIFICATION

Assigning a number or name to each animal in the herd is a good plan. When a calf is dropped or a new animal is added to the herd, it should be assigned a new name or number. Many breeders attach to an animal's ear a fiber-disk ear tag on which the herd number is stamped. This tag is about the size of a quarter and is durable.

⁴ For further information concerning dairy-herd improvement associations, see Farmers' Bulletin 1604, *Dairy-Herd Improvement Associations and Stories the Records Tell*.

(Fig. 14.) It is attached with an ordinary hog ringer and if put on properly is not easily torn out, nor is it easily confused with the small metal tag that may be placed in the ear for identification in tuberculin testing.

A strap around the neck, to which is attached a metal tag with a number on it, is sometimes used. The strap will last for several years, and there is little likelihood of its being lost. However, straps are more expensive than fiber ear tags. The practice of slitting the ears for identification is not recommended because it gives the animal a bad appearance.

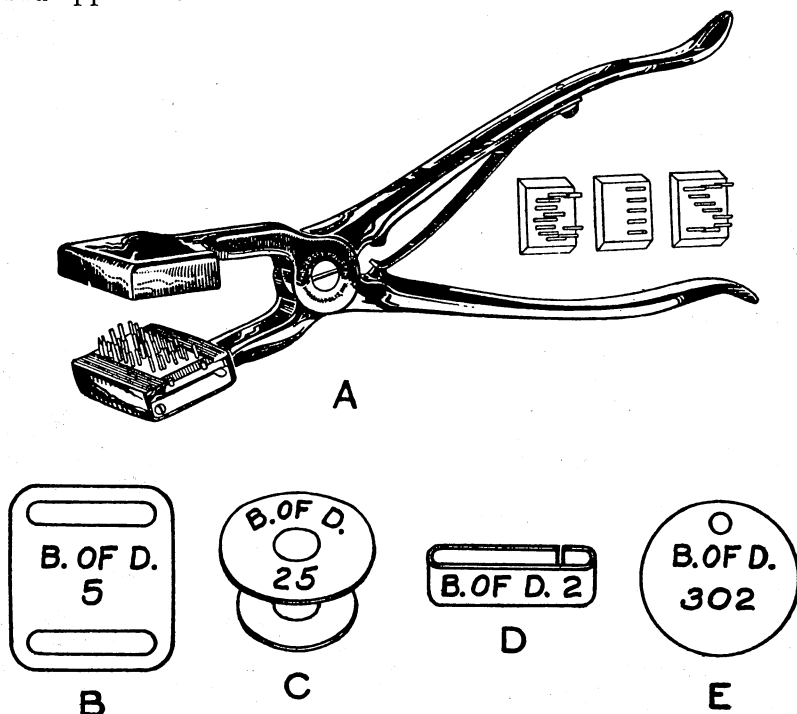


FIGURE 14.—Devices for marking cattle: A, Tattooing outfit; B, metal tag to go on strap around neck; C and D, metal tags; E, fiber-disk ear tag

Some breeders tattoo numbers in the ears of their animals and such marks are required for identification by some breed associations. Tattooing outfits are on the market. If the tattooing is properly done, it will last for the lifetime of the animal. However, the tattoo marks do not show distinctly on animals having dark skins. Even on light skins the tattoo numbers are often difficult to make out, and it is necessary to catch and hold the animal in order to see them.

A diagram showing the color markings of each animal can be drawn on a loose-leaf form provided by the breed associations. On the opposite side of this form is usually a 3 or 4 generation blank pedigree. A form of this kind filled out for each animal in the herd and kept in a holder will be of great help to the owner, especially if he has registered animals.

Registration papers for all registered animals should be kept on hand. Calves should be registered as soon as practicable. The national dairy-breed associations furnish directions and advice for registration. Their names and addresses are:

American Guernsey Cattle Club, Peterboro, N. H.
American Jersey Cattle Club, 324 West Twenty-third Street, New York, N. Y.
Ayrshire Breeders' Association, Brandon, Vt.
Brown Swiss Cattle Breeders' Association, Beloit, Wis.
Dutch Belted Cattle Association of America, Rockville, Conn.
Holstein-Friesian Association of America, Brattleboro, Vt.

In addition to the dairy-cattle breeds represented in this list, some breeds primarily developed for beef production are occasionally bred and used as dairy cattle. Their associations are:

American Devon Cattle Club, 51 Cornhill, Boston, Mass.
American Shorthorn Breeders' Association, 13 Dexter Park Avenue, Stockyards, Chicago, Ill.
Milking Shorthorn Society, Independence, Iowa.
Red Polled Cattle Club of America, Richland Center, Wis.

ADVANCED-REGISTER TESTING

The national dairy-breed associations have established advanced-register classes for purebred cows. Animals are entitled to entry in these classes when their production has reached a certain standard set by the association. Most of the breed associations have also adopted a system under which all the registered cows of the herd are tested. These tests and those for entry into the advanced-register class are usually conducted by representatives of the State agricultural colleges or experiment stations. Rules and regulations for conducting them differ according to the breed and the kind of test undertaken. Information can be obtained by writing the breed associations or the State agricultural experiment stations.

BUYING AND SELLING DAIRY CATTLE

RAISING v. PURCHASING FOR REPLACEMENT

Many dairy cattle are bought and sold each year. A beginner purchases cattle to establish his foundation herd. The owner of an established herd finds it necessary to dispose of surplus animals in order to maintain his herd at the desired size. Many dairy animals, because of old age, low production, disease, or unsoundness, are disposed of for beef. In some sections, especially those adjacent to market-milk centers, many dairymen do not raise young animals to replenish their herds but buy fresh cows when additional milk is needed. They believe this method is cheaper than raising calves and heifers on expensive milk and other feeds. In some other sections removed from market-milk centers, many dairymen make a considerable portion of their income by raising dairy cattle to sell.⁵

It is possible that in some localities dairy cows can be purchased more cheaply than they can be raised. The general practice of replacement by purchasing, however, is not conducive to improvement in the production of the herd. In fact, it is difficult to increase pro-

⁵ For information on the raising of dairy calves and heifers, see *Farmers' Bulletin* 1723, *Feeding, Care, and Management of Young Dairy Stock*.

duction economically by following this procedure. There is also the great danger of introducing disease when new animals from different herds are constantly brought in. Finally, this method provides little opportunity for the herd to increase in value, because mature animals are purchased and their value will decrease. If young animals are raised for herd replacements, their value tends to increase as they grow to maturity.

POINTS TO OBSERVE IN PURCHASING CATTLE

The buyer of dairy cattle is usually at a disadvantage, because in many cases production records are not available and he must rely largely on the appearance of the animals. If the buyer is inexperienced, he should obtain the advice of an experienced man. Several points should be kept clearly in mind:

(1) The breed and class of cattle to be purchased must be decided. Do you want to buy bred or open heifers, dry cows or milking cows? Dry cows or bred heifers ship better than do milking animals and do not need attendance enroute unless the distance is great. Often cattle of one particular class are in greater demand than those of another, and in some localities are consequently higher priced. For instance, during the flush-pasture season, when milk is relatively cheap, heavily milking cows usually are cheaper than cows bred to freshen in the fall and winter when milk prices probably will be higher.

(2) A locality where the particular breed of cattle you seek is plentiful and where the reputation of the breeders is good, is the best locality in which to buy. By buying where there are large numbers of cattle greater opportunity for selection is possible. If a buyer desires to purchase a carload (20 head), he should examine 60 to 75 animals of the class desired and select the best according to prices, breeding, and type.

(3) Only sound, healthy cattle should be bought. It rarely pays to buy unsound cows, such as those having faulty udders, knocked-down hips, etc. Even if the best judgment is used in making selections, some animals will be disappointing. Never purchase animals from herds that show evidence of having contagious diseases.

The accredited-herd plan for eradicating tuberculosis reduces to a minimum the danger of purchasing animals infected with this disease. (P. 24.) One should buy animals either from accredited herds or subject to their passing a clean test by a competent veterinarian.

Abortion disease (p. 24) probably offers the greatest difficulty to purchasers of dairy cattle, who should be constantly on guard. Many buyers make it a rule to purchase only animals that have passed a clean abortion test. Some States have laws requiring that all dairy cattle brought into the State and not intended for slaughter must have passed a negative agglutination or complement-fixation test. This does not affect the sale or purchase of cattle within a State. Whenever possible, it is advisable to purchase animals with the stipulation that they shall pass a negative blood test for abortion disease. If this is not practicable, animals should be purchased only from herds in which abortion or other disease is not evident at the time of purchase. By careful observation and questioning, facts

about the breeding condition of the herd can often be ascertained. Normal herds should produce approximately as many calves each year as there are cows in the breeding herd. As approximately one-half of the calves will be bulls and probably will have been sold, there should be about one-half as many heifer calves under 1 year of age as there are milking cows in the herd.

Newly purchased animals should be quarantined for 60 to 90 days before being turned in with the herd. If they are bought subject to a 60-day or 90-day retest for tuberculosis or abortion, this quarantine period makes it possible to obtain the retest before they are placed in the regular herd. Any abnormal condition will have manifested itself by that time.

SHIPPING DAIRY CATTLE

Over short hauls, dairy cattle can be transported by motor truck. Over long distances, however, it is advisable to ship them by freight or express. Cows in milk should have an attendant. Dry cows and heifers can be shipped without an attendant. The car should be well bedded and provision should be made for feeding and watering en route. In most cases, if enough good hay to last the cattle en route is provided, no other feed will be necessary. One or two clean barrels should be filled with water with a float on top to keep the water from slopping out. Buckets with which to water the animals should be provided. If the barrels do not hold sufficient water to last for the trip they can be refilled at stops. If barrels and buckets are provided the train crew will see that the animals are watered.

The car should be thoroughly disinfected with a standard disinfectant before cattle are loaded into it. This disinfecting is best accomplished by thorough spraying.

In shipping young animals, it may be best to turn them loose in the car, or if there are only a few of them they can be penned in one end. It is best to tie cows, preferably in the ends of the car, and leave space in the center of the car for barrels, buckets, and extra feed.

COMMON AILMENTS OF DAIRY COWS

INDIGESTION

When a cow has indigestion, commonly termed "being off feed," she refuses part or all of her ration, she is dull, she may have fever, and her milk yield is diminished. Although her appetite may return to normal in one or more days, depending upon the severity of the attack, her milk yield is generally somewhat slower in doing so; in fact, most cows, after being "off feed," never produce as much as they did before.

Common causes of this trouble are too much concentrated feed; moldy, decayed, or unsuitable feed; insufficient water; cold drafts; and extremely warm weather. The treatment consists in reducing the quantity of feed given, removing any spoiled feed, giving plenty of water to drink, and administering a purgative, preferably Epsom salts, as a drench. The medicine usually is mixed with water or other liquid, placed in a long-necked bottle, and given to the animal through the mouth. A simple drenching tube can be made from an ordinary tin funnel and a piece of rubber hose. Such an apparatus is especially convenient for giving large quantities of liquid.

In giving a drench it is important to prevent any of the liquid from passing into the lungs, as this will cause pneumonia. The animal's head should be elevated and held with the attendant's arm only, not tied up. The head can then be lowered quickly and easily in case there is any sign of choking. If the animal is held by the nose, care should be taken that it is still able to breathe through the nose. Insert the mouth of the bottle or the end of the tube at the side of the mouth in front of the back teeth and on top of the tongue and administer the liquid slowly so as to give the animal plenty of time to swallow.

Drenching should be done by an experienced person or by a veterinarian.

TUBERCULOSIS

Tuberculosis is infectious and usually is chronic, taking a number of years to run its course, often with no visible symptoms. Consequently, the more chronic its character the more dangerous as spreaders of the disease are the animals affected.

The disease may be introduced into a herd by bringing in diseased animals, by feeding calves milk from tuberculous cows (this may happen in using unpasteurized skim milk from a creamery), by showing cattle at fairs, by shipping cattle in infected cars, or by pasturing them with other cattle that have the disease. The most reliable way to tell whether living cows have tuberculosis is to have them tuberculin-tested by a competent veterinarian.

Of all the plans tried for eradicating tuberculosis, the accredited-herd plan and the accredited-area plan offer the most promise and are accomplishing the best results.⁶ Under these plans all the cattle in a given herd, or in a given area, are tested for tuberculosis, and those which are found to be tuberculous are disposed of so that they may not continue to be sources of infection for healthy animals.

ABORTION

Abortion (expelling the fetus prematurely) is infectious, chronic, and very prevalent in dairy herds. The bacteria responsible for this disease are present in the pregnant uterus and active udder of an infected cow, and large numbers of the bacteria are expelled when the cow calves or when the fetus is aborted. Cows acquire the disease by consuming feed or water that has been contaminated with material from the genital organs of infected animals and by licking fetuses, afterbirths, and discharges contaminated with the disease.

The act of aborting probably is the most widely known and readily observed symptom of this disease. However, some cows not affected with the disease abort from other causes, and some cows with the disease do not abort. Therefore, the number of abortions alone is not a sure guide in determining the extent of the disease in a herd or in combating it intelligently. The blood test is a reliable means of telling whether a cow has or has had the bacteria in her body, but it does not indicate whether she will abort or produce a normal calf. However, the test is a reliable aid in determining what to do with a herd in which the disease is present.

⁶ Detection, control, and eradication of this disease are discussed fully in Farmers' Bulletin 1069, Tuberculosis in Livestock, Detection, Control, and Eradication.

At present no specific cure for abortion is known. The proper course to pursue against it depends in a measure upon the extent of the disease in the herd. If only a small percentage of the cows are infected, as indicated by a blood test, the most economical method probably would be to sell the infected cows to the butcher, thoroughly clean and disinfect the stables and barn lots, give a blood test at frequent intervals to the remaining animals, and dispose of those that react. If all or a large percentage of the herd are found to be infected a herd free from the disease may be built up by raising the calves on clean premises.

Losses from abortion can be materially reduced by separating all aborting and calving cows from the herd until all discharges cease; disposing of fetuses, afterbirths, and discharges; cleaning the stable with hot water and soap; and using clean methods in all work about the herd.⁷

STERILITY

Sterility, or barrenness, is prevalent in dairy herds and may be temporary or permanent. Its presence interferes with the normal increase of the herd and leads to the maintenance of an excessive number of dry cows.

A number of causes may result in failure of a cow to conceive. Sometimes the fault is with the cow, sometimes with the bull. Each case, therefore, must be considered separately, both as to its cause and to its treatment.

Changes in the genital organs of the cow may be the cause. Some of these changes may be detected, and the organs may be benefited by treatment. The services of a capable veterinarian are essential in handling such a case to the best advantage.

Cows with relaxation or lack of tone of the uterus may not conceive. Their genital organs hang far forward in the abdominal cavity as if they were entirely inactive. Most of these cows show increased vigor and muscular tone when forced to walk several hours each day, and a large percentage of them become pregnant.

In many cases examination shows no pathological cause for failure to conceive. However, most cows in this condition become pregnant after being fed sprouted oats from 60 to 90 days. From 2.5 to 5 pounds of dry oats per cow are sprouted and fed daily. It has been found that oats germinated so that the sprouts show through the grain from one-quarter to one-half inch give the most satisfactory results.

DIFFICULT CALVING

Usually a cow will calve without assistance if she is kept quiet. Strangers, children, and particularly dogs, should be kept away. The stall or other place where the calf is to be born should be clean. Before labor has progressed to any great extent, it is well to see that the presentation of the fetus is normal; that is, that the front feet and nose are first to appear. Sometimes one or both feet or the head is doubled back. When this occurs, calving without assistance is difficult or impossible. The calf should be placed in proper

⁷ Details of this disease and its treatment can be obtained by writing to the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C., or to your State experiment station.

position to be born; and this usually necessitates pushing it back into the uterus, an operation which is sometimes rather difficult. Unless a person is skilled in such work it is better to call a veterinarian than to attempt it unaided. A bungled job may mean serious laceration of the uterus or vagina, or death of the cow or calf. Calves can be born hind feet first. When this occurs, some one should be on hand to see that delivery is hastened at the critical moment; that is, when the blood supply to the calf through the navel cord is shut off. The calf must then be able to start breathing or it will smother.

Sometimes assistance is needed, especially by young cows, even when the presentation is normal. Hence the cow should be watched rather closely, but no help should be given unless it is necessary. Time must be allowed for the relaxation of the openings from the uterus and vagina. In general, labor should continue for several hours before any help is given, although the condition of the cow should be taken into consideration. She should not be allowed to become too much exhausted before receiving help.

In helping the cow, take hold of the calf's feet if they protrude; otherwise, pass cotton ropes around them, and pull hard every time the cow strains. Do not pull at any other time, and do not be in a hurry about getting the calf. Too much haste or excessive pulling may injure both cow and calf.

As soon as the calf is born, clip the navel cord about 1 inch from its belly, squeeze out the few drops of blood, and apply tincture of iodine.

The afterbirth usually is passed in a few hours; but if it is not expelled naturally within two days, most veterinarians think it best to remove it by hand. This removal should not be attempted by an unskilled person, as care must be taken to avoid injury in disengaging the cotyledons which attach the afterbirth to the uterus, and special effort must be made to get all the afterbirth. It is also necessary to avoid introducing infection into the uterus by dirty hands or irrigating tube. If a discharge follows the removal of the afterbirth, the vagina should be flushed every day or so until all discharge ceases.

MILK FEVER

Milk fever is a disease that generally attacks mature cows that have had three or four calves. It usually occurs within three days after the cow calves. It may, however, attack any cow at any time during her lactation period or a day or two before calving. High producers or fat cows are more subject to milk fever than low producers or thin cows. It is thought that plenty of water and salt and very little concentrated feed for several days before and after calving will help to prevent this disease.

Milk fever may be recognized by the cow's staggering gait and lack of control of her hind legs. As the disease progresses the cow goes down in a stupor, lying in a normal position, except that her head is usually turned to her flank. Later, paralysis may become general, and then the cow lies on her side.

The treatment consists of inflating each quarter of the udder with air filtered through a liquid or cotton. Almost any sort of

air pump will serve to force the air into the udder. Every dairyman should keep a milk-fever outfit on hand for quick use. Satisfactory outfits can be bought or they can be made at little expense from a bicycle pump, rubber tubing, a piece of large glass tubing in which to place the cotton, and a milk tube. Care must be exercised to have the milk tube sterile, and the ends of the teats should be cleansed with a disinfecting solution. After inflation the teats should be tied with tape to prevent escape of the air. Ordinarily one inflation is sufficient; but in case the cow shows no improvement in two hours, the inflation should be repeated. See that the cow lies on her brisket rather than flat on her side. Bags or bales of straw or hay can be used to prop her in position.

Recent investigations point to a lack of lime in the blood as the cause of this disease, and cows have been successfully treated by injecting calcium gluconate into the blood stream.

GARGET

"Garget," "mastitis," and "mammitis" are terms used more or less synonymously to denote inflammation of the udder. Cases of inflammation vary greatly in severity. Some are so mild that they can not be detected by looking at the udder or feeling of it. In the more severe cases one or more quarters may appear swollen, or be hard, hot, and sensitive to the touch. The milk is reduced in quantity and may be watery or contain clots, flakes, or strings of curd. Other cases of inflammation may be so severe as to cause the death of the cow.

The primary cause of garget is the presence of bacteria in the udder. So far as is known at present the bacteria gain access to the udder through the teats. There is no doubt, however, that many apparently normal udders continually harbor bacteria that produce garget but do no harm until the animal's resistance is lowered. Some of the conditions which lower the resistance are: (1) Exposure to drafts, or extreme cold or very hot weather; (2) bruises or injuries of the udder or teats; and (3) disturbances of the digestive tract.

Bacteria causing garget are transmitted from one cow to another by the milk of an infected cow coming in contact with the teats of a healthy cow. This occurs easily by means of the milker's hand, teat cups of milking machines, rags used in cleaning the udders before milking, and milk spilled or milked on the bedding or floor of the stalls.

To prevent the spread of this disease the milk from each cow in the herd should be examined at least once a week. Draw a few streams of the foremilk from each teat into a stripping cup that has a fine wire strainer in its top to catch any flakes or clots that may be in the milk. If any of these symptoms of garget are found, stand the cows in the stable in the order of the severity of the trouble with the healthy cows at the end opposite those most affected and then milk them in the order of their freedom from garget. Washing the hands before milking each cow and using clean cloths to cleanse the udder before milking will help to avoid carrying bacteria from one cow to another; or if a milking machine is used, the teat cups should be rinsed in water and dipped in a chlorine solution before each cow is milked. The floors of the stable should be kept free of milk.

Treatment⁸ consists of giving a dose of Epsom salts or other purgative, frequent milking, and placing hot applications on the affected parts for at least 30 minutes several times a day. After making the hot applications, dry the udder and rub oil in to prevent chapping. Any special treatments, such as the use of bacterins, should be given only under the direction of a competent veterinarian. Cows rarely recover entirely from a severe case of garget. While they may appear normal for a time the trouble is quite likely to recur.

COWPOX

Cowpox is an infectious disease which causes characteristic sores on the udder and teats. Tenderness and redness of the teats occur first, and are followed by an eruption of grayish-red nodules. A vesicle or blister forms in the center of each nodule in about 10 days; and in another 3 days the blister breaks, discharging a yellowish serum, and a scab then forms.

Treatment consists of healing the sores left by the blisters. Any oil or neutral ointment is a very good remedy, as it keeps the affected parts soft, thus preventing cracking and bleeding. Since this disease is commonly carried from one cow to another by the milkers, the affected animal or animals should be milked last; and, as a further safeguard, the milker should cleanse his hands after milking each cow in the herd.⁸

FOUL FOOT

Foul foot is rather common in dairy herds. This disease causes great reduction in milk flow as well as rapid loss of weight of the animal. The hind feet are most likely to be affected. It is thought that infection from stable filth gains entrance through an abrasion or from foreign matter wedging and remaining between the claws until irritation is set up. The affected foot becomes inflamed, sore between the claws, and gives off an offensive odor.

Treatment should be administered at the first sign of the disease. If it is delayed, the trouble may become more or less chronic and spread to the joints of the legs or to other parts of the body. Clean the affected part and treat it with a strong disinfectant. In advanced cases it may be necessary to put a pad and bandage between the claws to keep out dirt until healing takes place.

BLOAT

Bloat may be caused by any kind of feed which causes indigestion and forms gas in the paunch. Young clover or alfalfa pasture (especially with the dew on) and spoiled silage or roots may cause bloat. The paunch is inflated most noticeably on the left side. In severe cases the distention may extend above the back. When tapped with the fingers the paunch gives a drumlike sound. When bloat is pronounced, the animal has difficulty in breathing. Place a rope, hose, or bit of some kind in the animal's mouth and exercise the animal by compelling it to walk. The purpose of this treatment is

⁸ See Farmers' Bulletin No. 1422, Udder Diseases of Dairy Cows.

to get rid of the gas through the mouth. If this does not help, give two tablespoonfuls of kerosene, turpentine, or formalin in one quart of warm water as a drench. After bloating has subsided, give one pound of Epsom salts in three pints of warm water as a drench. If these remedies are not effective, and in urgent cases where the gas must be allowed to escape without delay, it may be necessary to puncture the paunch. This is best done with a trocar and canula. The trocar is a sharp-pointed instrument which fits smoothly into a hollow tube called the canula, leaving the sharp point exposed. After inserting the trocar and canula by a quick, firm thrust inward, downward, and forward, the trocar is pulled out and the canula left in the opening. This will allow the gas to escape. The paunch is punctured on the left side with the trocar at a point equidistant from the last rib, the hip bone, and the loin.

The animal should be fed sparingly on easily digested feed for several days after bloating has stopped, so that all fermenting material may pass out of the stomach.

NAILS OR WIRE IN THE STOMACH

Cows will eat pieces of wire, nails, small stones, and other objects when mixed with their feed. There is one compartment of the stomach where such material is collected and held. Most of it does no apparent harm, but occasionally a sharp-pointed object punctures the wall of the stomach and either pierces the heart or other vital organ or sets up an infection which eventually is fatal. Pieces of wire 2 or 3 inches long and of the kind used for baling wire or light fencing are the most common causes of trouble of this kind. Violent exercise or perhaps a greatly distended paunch serves to start the foreign object on its fatal journey.

The symptoms first noticed are general depression, refusal of feed, and reluctance to move. If infection has been set up by the foreign body the animal may have a fever. When a cow is suffering from a wire or nail coming in contact with the heart or the sac surrounding the heart, the breathing becomes short and often is accompanied by a gentle grunt at each respiration. The heart beats much faster than normal. In advanced stages the splash caused by the beat of the heart in the fluid surrounding the heart is sometimes plainly audible, and the brisket may become swollen.

Affected cows nearly always die. Operations to remove the foreign bodies have been performed successfully by skilled veterinarians, but by the time the trouble can be definitely diagnosed it generally has progressed to a stage where an operation will not save the animal's life. The usual treatment consists in keeping the animal as quiet as possible and in avoiding the feeding of large quantities of roughage.

In combating this trouble the dairy farmer must rely upon prevention rather than cure. Pliers instead of a hatchet or ax should be used for cutting the wire on baled hay or straw since they sever the wire at one cut and there is less likelihood that short pieces will be broken off and mixed with the hay or straw. The use of baling wire for making repairs or for other purposes around the cow stall should be avoided. Fencing that is falling apart on account of rust

should be disposed of, as cows often reach under the fence to get grass. Some farmers and most feed manufacturers have provided magnets for removing pieces of wire and other foreign bodies from all ground feed, but so far no practical method has been devised for removing such objects from roughage.

WARTS ON THE TEATS

Sometimes warts on the teats attain sufficient size to interfere with milking. One method of removing them is to apply castor oil or pure olive oil after each milking for a week. If this treatment fails, the warts can be touched with a stick of lunar caustic and the oil applied after that. Long warts that are not too large at the base may be removed by tying a silk thread tightly around the wart near the teat and allowing the thread to remain until the wart drops off.

CRACKED TEATS

Sometimes a cow's teats chap in the winter from exposure and cold when they are moist. The remedy is to milk with dry hands and to see that the teats are dry when the cow is turned out into the cold. Wet milking and the sucking of the calf make them more liable to chap. In case cracking occurs, the treatment consists in keeping the teats soft with applications of oil or salve. This will protect them from excessive drying and continued cracking.

INSECT PESTS

WARBLES

Warbles or grubs are the larval stage of the warble or heel fly. The larva is about $\frac{1}{2}$ to 1 inch in length and is whitish or brown in color. In the spring the grubs get under the skin of the cattle, along the back, causing the animals to fall off in flesh. They lower the value of the hide because of the holes they make in it, and they probably lower the milk flow, although no investigations on this subject have been made. These grubs should be forced out through the hide by pressure beneath the lump, and should be destroyed. Applications of fly sprays during the summer are probably of little value in keeping off warble flies.

LICE

The first effects of infestation by lice are usually a scurfy skin and patches of hair falling out around the tail head or the withers. Unless the lice are killed, the animal may become thin and lose much of its hair. Young calves are especially affected. Lice are easily destroyed by a solution of standard stock dips. Recommendations for preparing the solution are given on the container and may be followed with safety. Although the dipping vat is the easiest and most effective means of killing the lice on dairy cattle, the expense of building and maintaining a vat for this purpose is too great to justify its use. It is not a big job to go over the herd by hand with a brush and the disinfecting solution. If this is done in the winter, a mild day should be selected. Ordinary powdered borax sprinkled along the top line of the animal from poll to tail will lessen the attacks of the lice until a more thorough job with a stock dip can be done.

FLIES

Flies are a great nuisance around a dairy. House flies may contaminate the milk and they annoy the cattle by feeding on eye and other body secretions. These flies do not have piercing mouth parts; their food is organic matter. Stable flies have piercing mouth parts; their food is blood. Therefore, they greatly annoy the cattle and attendants. Both house and stable flies soil walls and equipment. These two kinds of flies look much alike. In addition to them, there are the small black horn flies, which are especially bothersome on account of their great numbers.

Flies breed in filth or decomposing matter of various kinds — house flies in fresh horse and calf manure, stable flies in wet and rotting straw or other vegetation, and horn flies in fresh cow droppings.

Cleaning up breeding places is one of the best ways of fighting all kinds of flies. Do not allow chaff and feed to accumulate in corners of stalls and mangers, especially in the stalls of calves receiving milk in any form. Early in the spring, remove straw stacks from the yards and straw that has been banked around water troughs and buildings. Do not

allow droppings to accumulate in lanes and yards. If manure is piled in the open, haul it away at least once each week from early spring until winter. Although flies can travel considerable distances, the farmer can do much to lessen the number on his own farm, as most of them, under usual farm conditions, are bred there.

Another good way of getting rid of house flies is to use properly baited traps. (Fig. 15.) A good bait is made from 1 part sugarcane blackstrap molasses and 4 parts water. This bait should be renewed at least once each week. Other kinds of molasses, fruits, dried milk, and feed may be used but are not so good as the sugarcane blackstrap molasses and must be renewed more frequently. Traps should be placed where flies gather, preferably on the floor, in a spot free from strong currents of air and where there is good light.

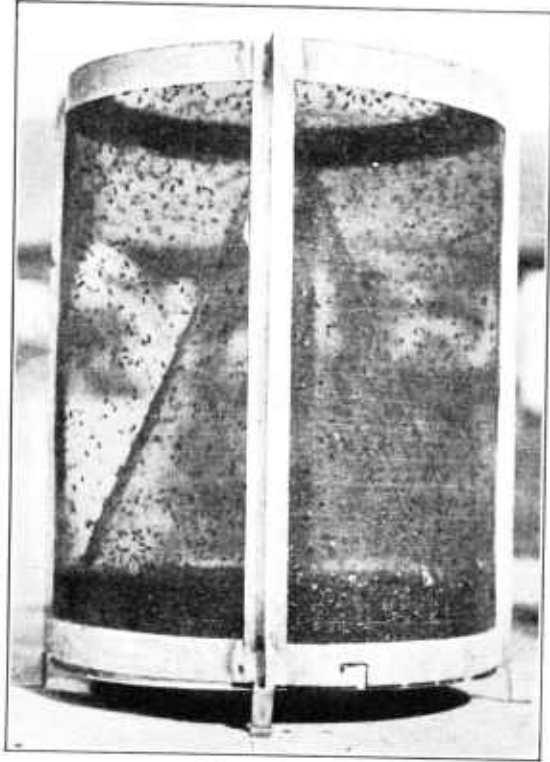


FIGURE 15.—A large flytrap of good design

Stable and horn flies are not attracted by bait, but they may be killed by a spray. No repellant has yet been devised that will protect animals for more than a few hours. A cheap and effective killing fly spray can be prepared by suspending for 24 hours or longer a 5-pound bag of half-closed pyrethrum flowers in 9 gallons of kerosene and 1 gallon of furnace fuel oil of 28° to 32° gravity. This mixture is applied with a pump equipped with a nozzle to deliver a very fine spray over a considerable area. (Fig. 16.) Not all flies hit will be killed immediately; some seen flying away will soon die from the effects of the spray. Large dairies find it practical to use a large

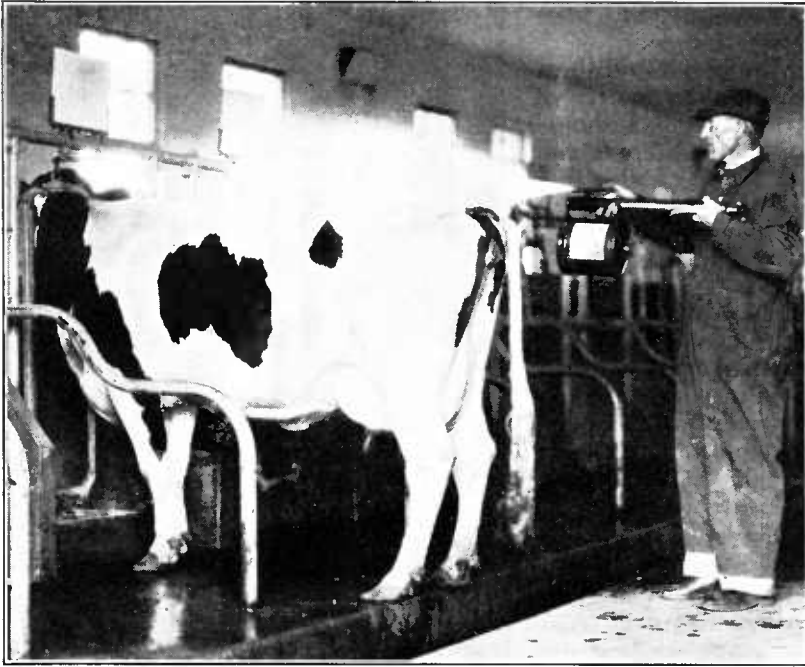


FIGURE 16.—A good type of spray pump

power sprayer, by means of which the barn can be filled with a fine mist when the flies have gathered. This sprayer, however, may be too expensive for use in small dairies. Flies may be sprayed while they are on the cattle, when they are on the walls, or at places where they have gathered for feeding. If they are sprayed while on the cattle, care should be taken that the spray is directed parallel with the animal and that the animals are not brushed immediately afterward, as the kerosene will blister the skin. Since horn flies stay on the cattle most of the time they are easily hit with the spray.

The pyrethrum flowers can be purchased from drug stores or wholesale druggists. A concentrated extract of pyrethrum flowers, which is ready for use when the kerosene and fuel oil are added, also is on the market. The extract is more convenient to use but is a little more expensive.

BAD HABITS

KICKING

Kicking during milking is due largely to poor management. Many heifers kick when they are being broken to milk, and must be carefully handled so that they will not form the habit. Sore or cracked teats also cause cows to kick. Never strike a cow for kicking. Such practice will excite her and make her worse. Some animals must be restrained while being milked. This is best accomplished by placing a heavy strap around the rear legs just above the hocks. Pass the strap around one leg, cross between the legs, and then around the other, drawing them close together. Unless crossed in the middle the strap will slip down when the cow struggles.

SUCKING

Every dairyman has had experience with cows that suck themselves. There seems to be no satisfactory explanation of why they do this. To prevent the habit, many devices and methods have been tried with varying degrees of success. One device may work successfully on one cow and fail on another.

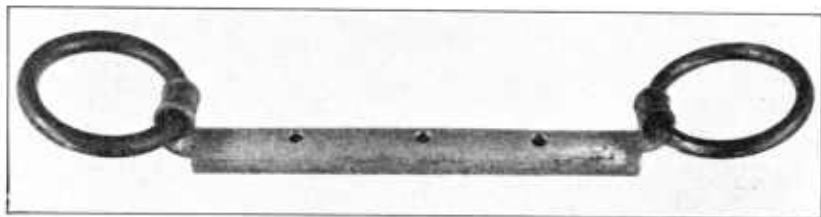


FIGURE 17.—This bit will prevent a cow from sucking herself or other cows

A device that can be recommended is a bit made of $\frac{1}{2}$ -inch pipe through which several small holes have been drilled. The bit is equipped with rings like those in a horse's bit, and is attached to the cow's halter with snaps. (Fig. 17.) When the cow tries to suck, air is admitted through the holes in the bit and prevents suction. The bit should be removed occasionally and the holes cleaned. If the cow's mouth gets sore, remove the bit while she is standing in the stanchion.

DEHORNING

Horns are of no use to the dairy cow. She no longer needs to fight for self-protection or for the protection of her young. Cows with horns often injure one another in the stable or lot, and sometimes accidentally injure attendants. Bulls with horns are decidedly more dangerous than those without. The only excuse for allowing animals to retain horns is appearance; it is very questionable whether the horns on a large proportion of the animals, however, really improve their appearance. Still, horns do sometimes increase the selling price of an animal and may better its chances in the show ring. As long as these advantages exist, it may be advisable to let the horns remain on some of the registered animals.

In dehorning cattle or in preventing horn growth, the skin from which the horn grows should be removed or destroyed. In the young calf, this skin covers the horn button; later it lies at the base of the horn and surrounds it. Growth of horns on young calves a few days to a few weeks old may be prevented by rubbing the horn button with caustic soda or caustic potash until the outer skin is removed. This can be done most easily as soon as the horn button can be definitely located.

Older cattle are dehorned with a saw or clippers. The skin at the base of the horns should be removed with the horns. If any of this skin is left, the horns will grow again and produce what are known as scurs. Pine tar usually is applied after the horns are removed. This helps to keep away flies and probably assists in checking the bleeding. A pack of cotton laid on the surface of the wound helps to stop bleeding. To avoid attacks by flies it is best to dehorn late in the fall, during the winter, or early in the spring. Experiments indicate that the milk flow of dairy cows is not seriously affected by dehorning the cows.